

FURTHER STUDIES ON THE TARSONEMIDAE. II
(ACARINA)

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ABSTRACT—A new genus and four new species of tarsonemid mites, *Tarsonemus summersi*, *T. adamsi*, *Daidalotarsonemus jamesbakeri* and *Heterotarsonemus lindquisti*, are described and illustrated. The mites were collected during ecological studies of the eriophid blueberry bud mite, *Acalitus vaccinii* (Keifer), and of the southern pine beetle, *Dendroctonus frontalis* Zimmerman. *Tarsonemus confusus* Ewing is redescribed and illustrated.

This paper includes studies on tarsonemids collected during ecological studies of the eriophid blueberry bud mite, *Acalitus vaccinii* (Keifer), in North Carolina and of the Southern pine beetle, *Dendroctonus frontalis* Zimmerman, in Louisiana.

Two new species of *Tarsonemus* Canestrini and one new species of *Daidalotarsonemus* De Leon are described. The new tarsonemids were found in association with the blueberry bud mite and were submitted for identification by James R. Baker, Department of Entomology, North Carolina State University at Raleigh. Beer (1963) describes social parasitism involving tarsonemid and eriophid mites, but the relationship of the new tarsonemids and *A. vaccinii* (Keifer) does not seem to be the same (James R. Baker, personal communication). A new genus, *Heterotarsonemus*, is proposed for a mite discovered in the course of research on the seasonal ecology of *D. frontalis* Zimmerman by John C. Moser, U.S. Forest Service, Southern Forest Experiment Station, U.S. Department of Agriculture, Pineville, Louisiana.

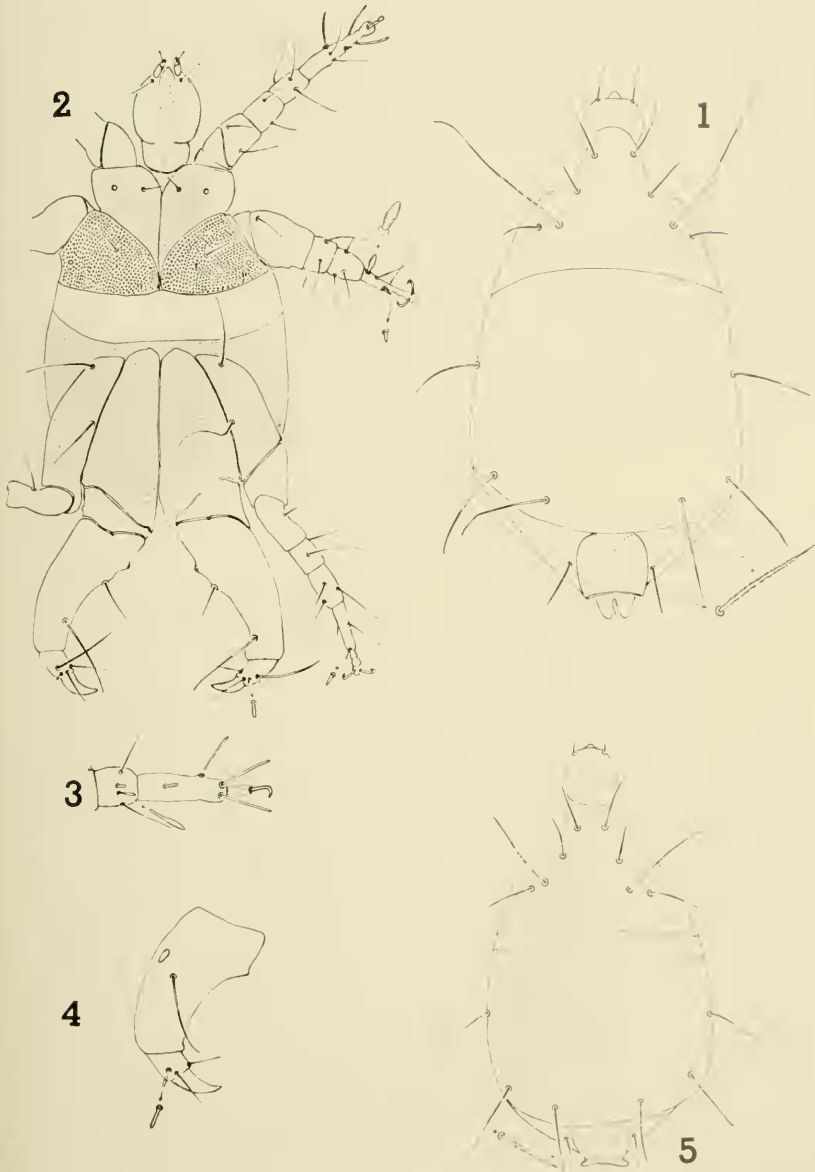
Tarsonemus confusus Ewing which was found associated with the blueberry bud mite in the field as well as with the nematode *Aphelenchus* sp. in a laboratory culture is redescribed and figured.

***Tarsonemus summersi*, n. sp.**

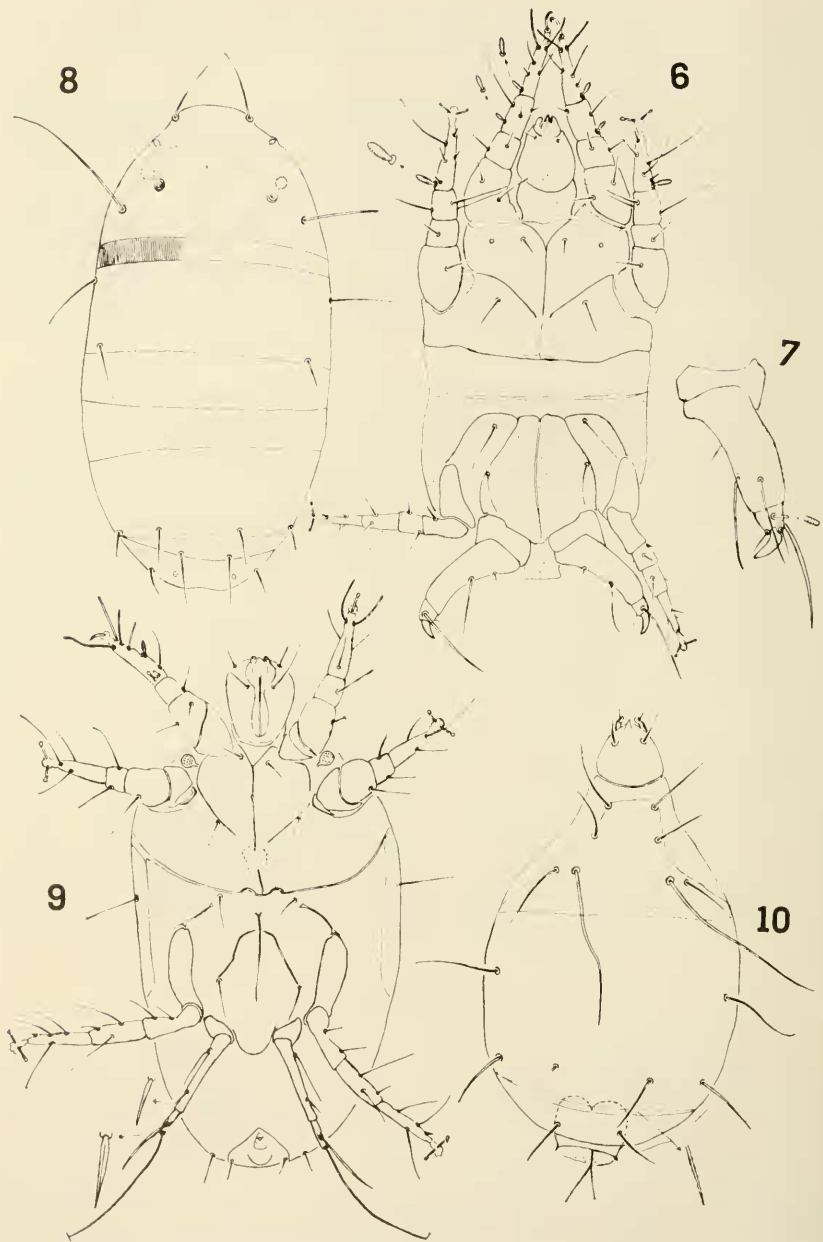
(Figs. 1-4)

The large, dorsal, spurlike apophysis on femur IV of the male will separate this species from other known species of the genus. The female is not known.

Male. Body oval, broadest in region of metapodosoma. Dorsal propodosomal setae simple, long and slender; third pair of propodosomals longest, more than twice as long as first, second, and fourth pairs; second pair two-thirds as long as first pair; fourth pair shortest, about two-thirds as long as second pair. Hysterosoma with three pairs of finely serrated setae; two pairs of setae above suture twice as long as single pair below suture; a pair of simple lateral setae present. Venter of propodosoma as figured; apodeme I short, forming Y-shaped juncture with anterior median apodeme; apodeme II long, strong and curving inward to anterior median apodeme to form apodemal plate II; apodemal plate I with pore, a short seta, and



Figs. 1-4, *Tarsonemus summersi*, n. sp.; ♂: 1, dorsum; 2, venter; 3, right dorsal tibiotarsus I; 4, leg IV. Fig. 5, *T. confusus* Ewing, ♂, dorsum.



Figs. 6-9, *Tarsonemus confusus* Ewing: 6, ♂, venter; 7, ♂, right dorsal leg IV; 8, ♀, dorsum; 9, ♀, venter. Fig. 10, *T. adamsi*, n. sp., ♂, dorsum.

with fine striae; apodemal plate II with strong dot-like striae, a pore, and a simple seta longer than seta on apodemal plate I. Venter of hysterosoma as figured; apodemal plates III and IV with longitudinal striae, plates III each with pair of simple setae. Legs I and II similar in size and length; legs II short and strong and with strong solenidion on each tarsus as figured; legs V with apophysis on inner lateral margin of each femur; setae for these legs as figured. Body 159 μ long by 89 μ wide.

The male holotype, USNM 3282, and 5 male paratypes were taken from a laboratory culture of necrotic blueberry bud scales and agar 13 February 1967, Department of Entomology, University of North Carolina at Raleigh. Two male paratypes were collected from blueberry buds, Ivanhoe, North Carolina 11 January 1966 and 1 male paratype 11 September 1965 by J. R. Baker. One paratype is deposited in the Canadian National Collection. The species is named for Dr. F. M. Summers, Department of Entomology, University of California, Davis, California.

***Tarsonemus confusus* Ewing**

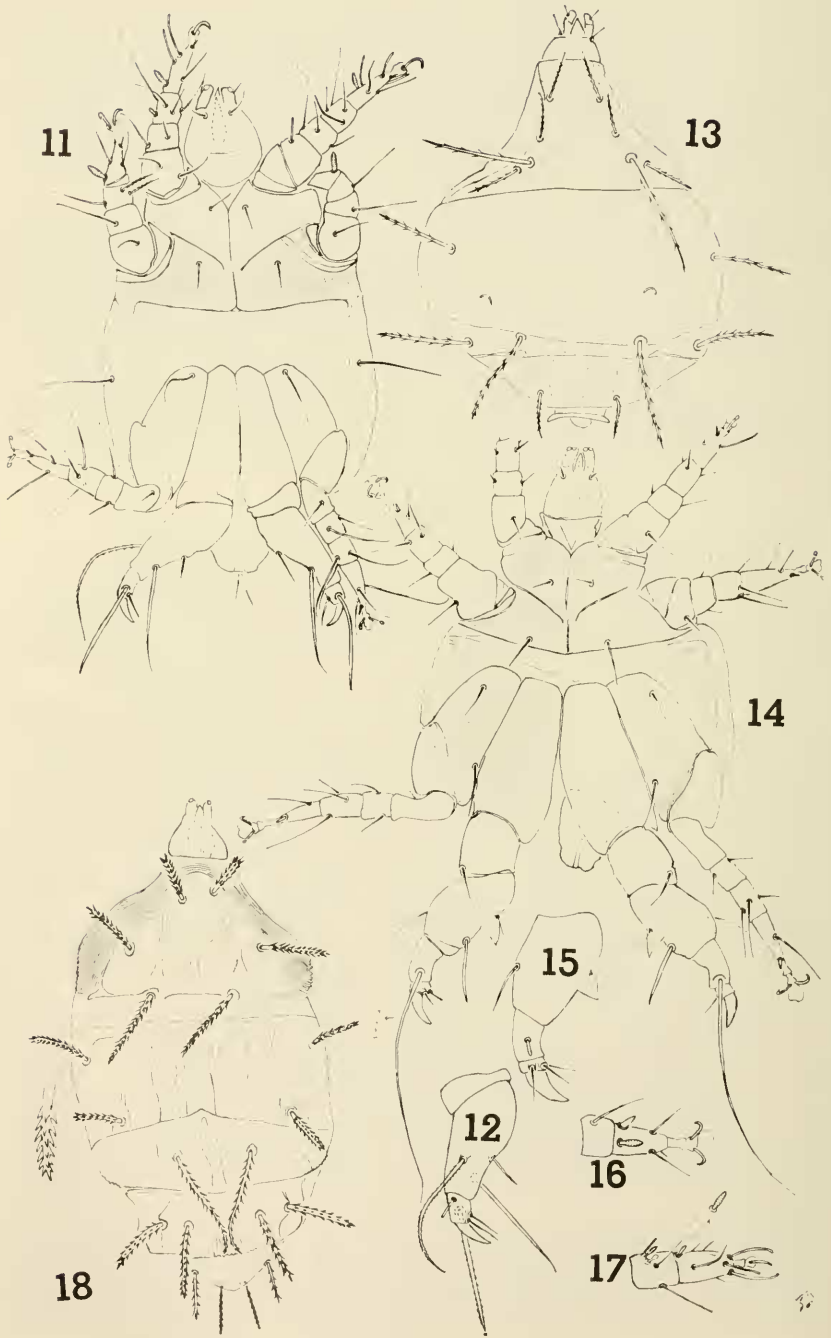
(Figs. 5-9)

Tarsonemus confusus Ewing, 1939, U.S. Dept. Agr. Tech. Bull. 653: 1-63.

The male of this species may be recognized by the finely serrated hysterosomal setae, and the ventral striation pattern. The female may be recognized by the transverse apodeme having inverted U-shaped bends near the base of the anterior median apodeme.

Male. Body small, oval, broadest in the region of propodosoma. Dorsal propodosoma with four pairs of long, slender simple setae; third pair longest, one-third longer than first pair, first pair about one-third longer than second and fourth pairs; second pair shortest; fourth pair slightly longer than second pair. Hysterosoma with two pairs of long subequal, finely serrate setae caudally; a short pair on posterior margin of idiosoma; and a pair of simple lateral setae. Venter of propodosoma as figured; apodeme I short, curving to coxal condyles, and forming Y-shaped juncture with anterior median apodeme, anterior median apodeme well defined, but becoming small and faint at transverse apodeme; apodeme II strong but not converging with anterior median apodeme; apodemal plate I with pore, a simple seta, and with fine punctations near anterior median apodeme and apodeme II; apodemal plate II without pore, with a simple seta, and finely punctate. Venter of hysterosoma as figured; with fine punctations adjacent to apodeme III and distal to posterior median apodeme; apodemal plates III and IV with finely broken striae and each plate with a single simple seta. Legs I and II subequal in length and size; legs III smaller in size, but almost as long as legs I and II; leg IV as figured, with long femur bearing a proximal inner, simple seta, a simple seta medially and a simple seta dorsodistally; tibia IV with a small solenidion and saberlike seta; tarsus IV terminating with short, strong tarsal claw.

Female. Body elongate, broadest in region of hysterosoma. Propodosoma bearing two pairs of simple setae; first pair about one half as long as second pair; pseudostigmatic organs global, with small spurlike projections, pedicel not as long as width of expanded distal portion. Dorsum of hysterosoma with six distinct



transverse segments; first segment with a pair of simple setae; second and third segments without setae; fourth segment with two pairs of simple setae, the inner, median pair being about one-third longer than outer pair; fifth segment with a pair of simple setae medially, subequal in length to the outer pair on fourth segment. Venter of propodosoma and hysterosoma lightly punctate. First pair of ventral apodemes Y-shaped, converging with anterior median apodeme; a pair of simple setae adjacent to the first pair of apodemes; apodeme II longer and stronger, not converging with anterior median apodeme, with a pair of simple setae; anterior median apodeme discontinued as figured and not connecting with the transverse apodeme; transverse apodeme inverted U-shaped as it connects on each side with the anterior median apodeme. Venter of hysterosoma with a pair of lateral plates. Apodeme III not converging with the posterior median apodeme, above this apodeme a simple seta; apodeme IV longer and stronger than apodeme III, distally with a simple seta subequal in length to the seta above apodeme III. Legs robust, as figured.

Seven males and 36 females were collected on a culture of *Aphelenchus* sp. (nematode) by Roy Burrill at the Department of Entomology, North Carolina State University at Raleigh, 22 February 1968 and 12 females from blueberry buds by J. R. Baker of the same University at Ivanhoe, North Carolina, September 1965, 11 January and 7 November 1966.

***Tarsonemus adamsi*, n. sp.**

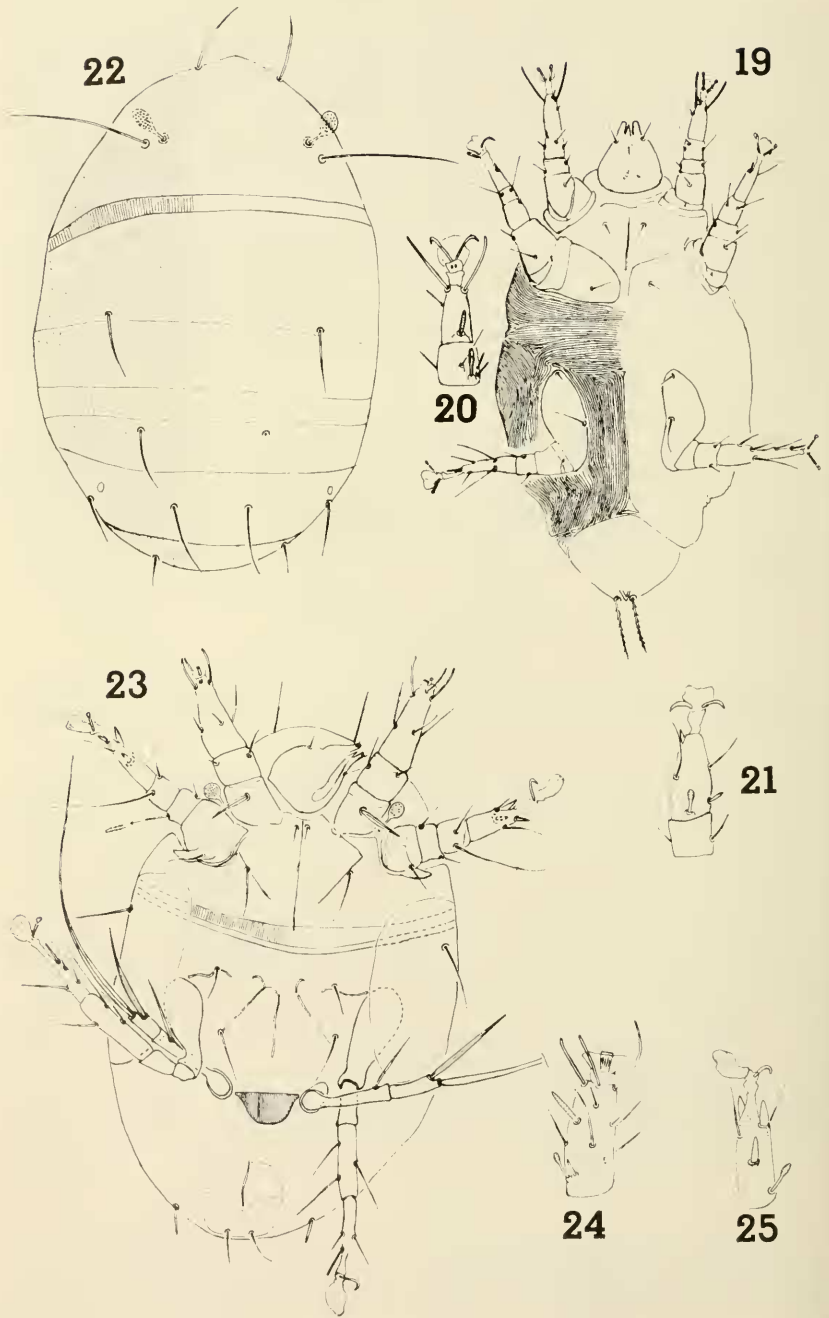
(Figs. 10-12)

This species, which is known only from the male, is characterized by the short, stubby femur of leg IV and by the extreme length of the third pair of propodosomal setae.

Male. Body oval, broadest in region of metapodosoma. Dorsal propodosomal setae simple, long and slender; third pair of propodosomals longest, three times longer than the first, second, and fourth pair; first and fourth pairs subequal in length and longer than the second pair. Hysterosoma with three pairs of finely scabrous setae; first two pairs subequal, lying transversely near the posterior margin; a shorter pair distally. Venter of propodosoma as figured; apodeme I short, forming a Y-shaped juncture with anterior median apodeme; apodeme II long and strong, curving inward to anterior median apodeme; anterior median apodeme discontinued, not converging with apodeme II, but connecting to transverse apodeme; apodeme plate II with dotlike punctations. Venter of the hysterosoma as figured; two lateral plates each with a simple seta; apodemal plate III with a simple seta; apodemal plate IV without setae. Legs I and II subequal in length and size; tarsus II with large solenidion, about twice the size of the solenidion on tarsus I; leg III smallest; leg IV with short, stubby femur, bearing a short, simple seta proximally and long, saberlike seta distally; tibia IV as figured, with a

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Figs. 11-12, *Tarsonemus adamsi*, n. sp., ♂: 11, venter; 12, left dorsal leg IV. Figs. 13-18, *Heterotarsonemus lindquisti*, n. gen., n. sp.: 13, ♂, dorsum; 14, venter; 15, ♂, left dorsal leg IV; 16, ♂, left dorsal tarsus II; 17, ♂, left dorsal tarsus I; 18, larva, dorsum.



strong scabrous seta; tarsus IV terminating with short, strong, tarsal claw. Body 146 μ long by 82 μ wide.

Female. Not known.

The male holotype, USNM 3280, was taken from a laboratory culture of necrotic blueberry bud scales and agar at the Department of Entomology, University of North Carolina at Raleigh, 13 July 1967, by James R. Baker. The species is named for Mr. G. G. Adams, of Washington, D. C.

Heterotarsonemus, n. gen.

Type-species: *Heterotarsonemus lindquisti*, new species.

The generic characters for the female are as follows: Pretarsi I with vestigial claws. Pretarsi II and III each with only a single outer lateral claw. Leg I tarsus and tibia fused. Femur II with ventral apophysis. The male is heteromorphic with the following characters: propodosomal and hysterosomal setae serrated; the venter of the propodosoma and hysterosoma, each with two pairs of simple setae. Leg IV is robust with the femur having a triangular shaped flange.

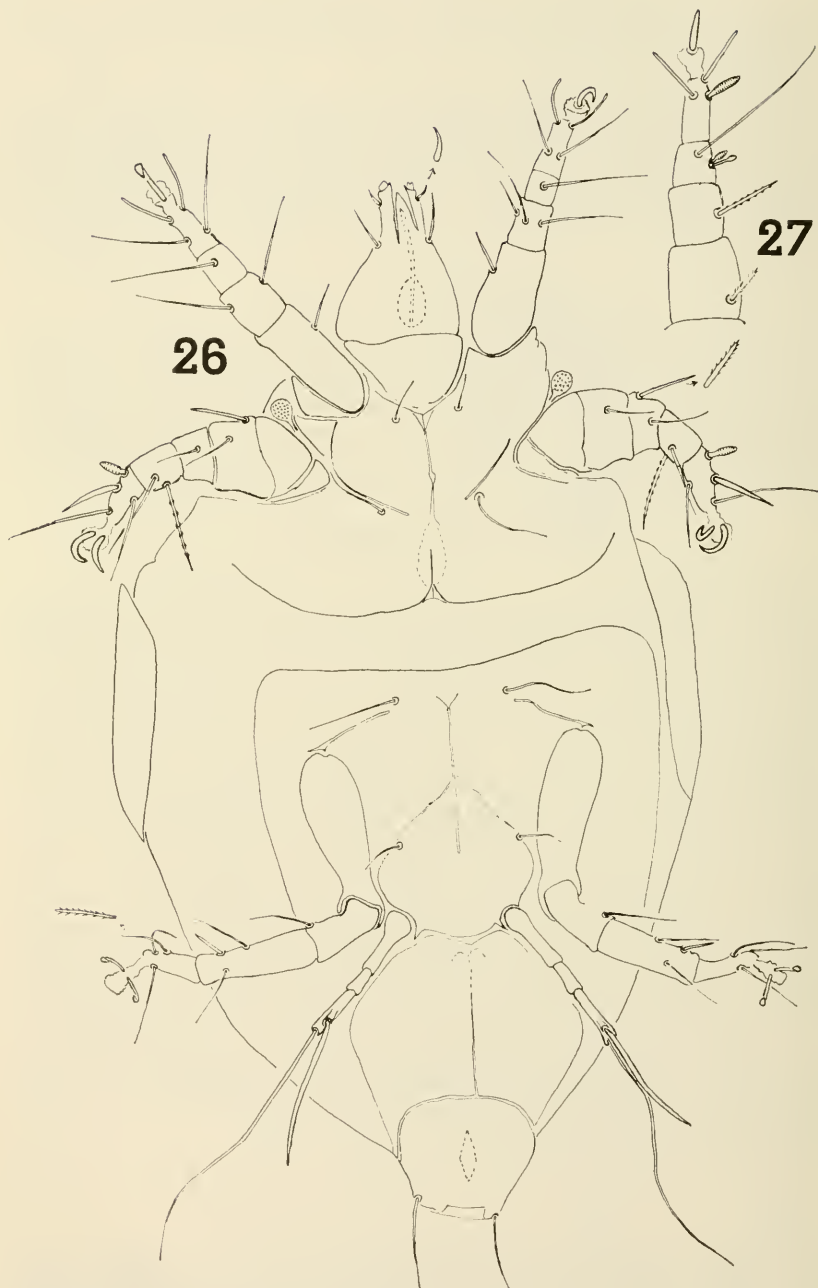
Heterotarsonemus lindquisti, n. sp.

(Figs. 13-25)

Female. Dorsum of body oval and finely punctate. Propodosoma dorsally with two pairs of setae; anterior pair short and stout, posterior pair long and slender and located above the macelike pseudostigmatic organs. Hysterosoma with six dorsal segments; first segment largest, with a pair of simple setae medially and posteriorly; second and third segments without setae; fourth segment with a pair of simple setae medially, subequal in length to those on the first segment; fifth segment with two pairs of setae, medial pair longer and subequal in length to those of first and fourth segments, a pore above each lateral seta; sixth segment with a pair of short setae marginally. Venter of propodosoma and hysterosoma as figured. Apodeme I short, converging with anterior median apodeme; apodeme II stout and longer, not converging with anterior median apodeme; anterior median apodeme converging with transverse apodeme. Seta on apodemal plate II longer than seta on apodemal plate I; seta on apodemal plate III not as long as seta on II; seta on plate IV subequal in length to seta on II. Leg I strong and robust; tarsus and tibia fused; femur ventrally with a strong dagger shaped seta. Leg II subequal in length to leg I; pretarsus with a small spur ventrally, dorsally with two stronger spurs; femur with a strong ventral apophysis. Leg IV longest, but not as stout as legs I and II; pretarsus ventrally with a long spur, longer than ventral spurs on tarsus II; pretarsus with a single outer lateral claw. Leg IV slender, terminating in a short and a long saberlike seta, each with a longitudinal ridge. Body 165 μ long by 108 μ wide.

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Figs. 19-25, *Heterotarsonemus lindquisti*, n. gen., n. sp.: 19, larva, venter; 20, larva, right dorsal tarsus and tibia I; 21, larva, right dorsal tarsus and tibia II; 22, ♀, dorsum; 23, ♀, venter; 24, ♀, left dorsal tarsus I; 25, ♀, left dorsal tarsus II.



Figs. 26-27, *Daidalotarsonemus jamesbakeri*, n. sp.: 26, ♀, venter; 27, ♀, left dorsal leg I.

Male. Body elongate and broadest in region of the metapodosoma. Dorsal propodosomal and hysterosomal setae serrated. Propodosomal setae slender with the exception of the third pair; third pair longer and stronger than first, second, and fourth pairs; first, second, and fourth pairs subequal in size and length. Hysterosomal setae stronger and longer than first, second and fourth pairs of propodosomals with the exception of the pair on posterior of opisthosoma being shorter; two pairs located in a transverse row, inner pair longer than outer pair which is subequal in length to lateral setae. With two small curved internal structures on the dorsal posterior portion of the hysterosoma (see figure 13). Venter of the propodosoma and hysterosoma as figured; with small dotlike punctations. Apodeme I curving inward to anterior median apodeme; apodeme II longer and stronger than apodeme I not converging with the anterior median apodeme; seta on apodemal plate I shorter than setae on apodemal plates II and III, setae for these two latter plates subequal in length; apodemal plate III with two pairs of setae; apodemal plate IV without setae. Legs I and II similar in size and length; legs III longer than legs I and II; tarsi I-III each ventrally with a small spur; leg IV robust, femur as figured with a triangular shaped flange, a small, simple seta projecting adjacently from the flange, and a dagger shaped serrated seta; tibia with a short dorsal sensory rod and terminating with a long serrated whiplike seta; tarsal claw strong. Body 114 μ long by 89 μ wide.

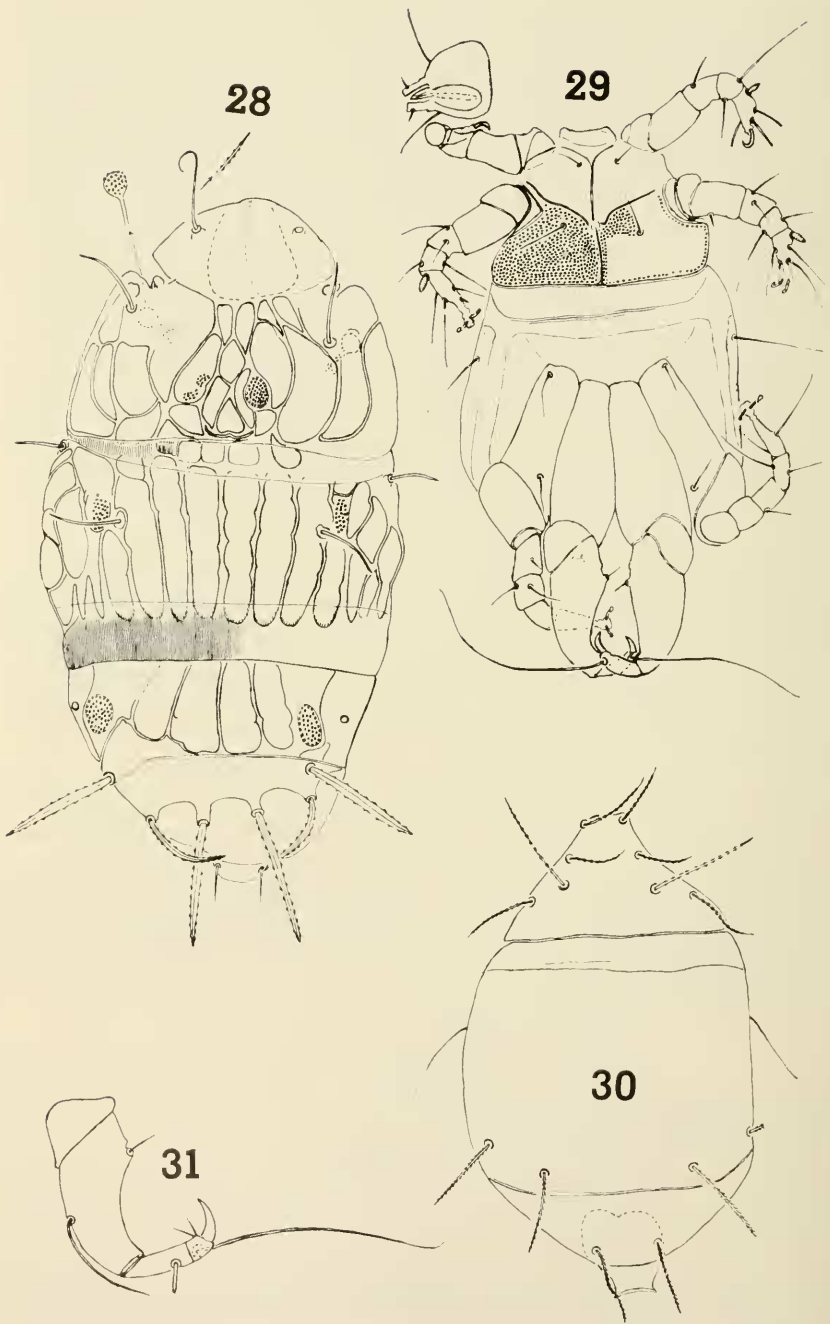
Larva. Body elongate, broadest in the region of the hysterosoma. Dorsal propodosomal shield with three pairs of serrate setae; integument adjacent to the shield with fine striae. Hysterosoma divided into four distinct shields; first shield with a pair of lateral and a pair of posteromedial serrate setae; second shield with a pair of long, serrate medial setae which are longer than rest of dorsal body setae; third shield with two pairs of serrate setae, the lateral pair shorter than the medial pair; fourth shield with a shorter pair of serrate setae. Venter of the propodosoma and hysterosoma as figured. Legs I-III subequal in size and length; each tarsus with a small spur. Body 146 μ long by 76 μ wide.

The female holotype, USNM 3284, and 15 female paratypes and 7 males and 7 larvae were collected from inner bark of loblolly pine with *Dendroctonus frontalis* Zimmerman at Elizabeth, Louisiana, 20 July 1965, by John C. Moser. Three paratype female, one male, and one larva are deposited in the Canadian National Collection. The species is named for Dr. Evert E. Lindquist, Canada Department of Agriculture, Ottawa, Ontario, Canada.

***Daidalotarsonemus jamesbakeri*, n. sp.**
(Figs. 26-31)

The contiguous dorsomedian longitudinal plates of the hysterosoma will separate this species from the others in the genus.

Female. Body broadly oval, broadest at metapodosoma. Dorsum of propodosoma with two pairs of setae; first pair slightly longer, finely scabrous; second pair simple and saberlike; a notch on lateral margin of capitulum; platelets of propodosoma irregular in shape and size, two platelets punctate. Dorsum of hysterosoma with six pairs of setae; lateral seta simple and saberlike, shorter in length than first similar dorsomedian seta; three pairs of serrated lanceolate setae each with a longitudinal ridge; a pair of small simple caudal set; with a pair of lateral pores



and adjacent to these pores a lightly punctate plate; dorsomedian plates contiguous, as figured, and with few smaller irregular shaped platelets. Venter of propodosoma and hysterosoma as figured. Apodeme I short, converging with anterior median apodeme; apodemal plate I with simple seta; apodeme II longer and stronger, not converging with the anterior median apodeme; apodemal plate II with a simple seta twice the length of seta on apodemal plate I; anterior median apodeme discontinued below apodeme II, a small posterior portion connecting with transverse apodeme; posterior median apodeme Y-shaped proximally, not converging with apodeme III, but converging with apodeme IV; apodemal plate II with a simple seta, longer than seta on apodemal plate IV. Genitalia as figured. Legs I-III short, robust; legs III longest. Tarsal claws large and strong. Body 223μ long by 134μ wide.

Male (associated with the above female). Body oval, broadest in region of metapodosoma. Dorsum of propodosoma with four pairs of long, slender, barbed setae; third pair longest, more than one half longer than second pair; second pair shortest; first and fourth pairs subequal in length. Hysterosoma with two pairs of setae located above suture and a pair below suture. Ventral apodeme of propodosoma and hysterosoma as figured. Apodeme I shorter than apodeme II; apodeme III and IV longer than anterior median apodeme; apodemal plate I with a simple seta which is shorter than seta on plates II and III; apodemal plate II lightly punctate, with a simple seta subequal in length to the seta on apodemal plate III. A pair of lightly sclerotized lateral plates slightly posterior to the prodosomal and hysterosomal suture. Legs I and III subequal in size and length; leg II robust, with extremely large solenidium; leg IV as figured. Body 185μ long by 95μ wide.

The female holotype, USNM 3283, and 5 female paratypes were collected from blueberry buds, 8 March 1967, Ivanhoe, North Carolina. One female paratype and the associated male were reared in a laboratory culture, Department of Entomology, North Carolina State University at Raleigh. After the illustrations were made for the associated male, this single specimen was accidentally destroyed in an attempt to remount the specimen. All specimens were collected and reared by James R. Baker for whom this species is named. One paratype is deposited in the Canadian National Collection.

REFERENCES

- Baker, J. E. 1968. Personal communication.
Beer, R. E. 1963. Social parasitism in the Tarsonemidae, with description of a new species of tarsonemid mite involved. *Ann. Ent. Soc. Amer.* 56(2): 153-160.
Ewing, H. E. 1939. A revision of mites of the subfamily Tarsoneminae of North America, the West Indies, and the Hawaiian Islands. *U.S. Dept. Agr. Tech. Bull.* 653:1-63.

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Figs. 28-31, *Daidalotarsonemus jamesbakeri*, n. sp.: 28, ♀, dorsum; 29, ♂, venter; 30, ♂, dorsum; 31, ♂, left dorsal leg IV.